

**CLASS IX (2019-20)**  
**SCIENCE (CODE 086)**  
**SAMPLE PAPER-7**

**Time : 3 Hours**

**Maximum Marks : 80**

**General Instructions :**

- (i) The question paper comprises of three sections-A, B and C. Attempt all the sections.
- (ii) All questions are compulsory.
- (iii) Internal choice is given in each sections.
- (iv) All questions in Section A are one-mark questions comprising MCQ, VSA type and assertion-reason type questions. They are to be answered in one word or in one sentence.
- (v) All questions in Section B are three-mark, short-answer type questions. These are to be answered in about 50-60 words each.
- (vi) All questions in Section C are five-mark, long-answer type questions. These are to be answered in about 80-90 words each.
- (vii) This question paper consists of a total of 30 questions.

## Section - A

1. Which of the following actions a force can do? [1]
- (a) Can move a stationary object.
  - (b) Can stop a moving object.
  - (c) Can change the speed of a moving object.
  - (d) All of the above.

**Ans :** (d) All of the above

2. Ozone layer protects us from which one of the following? [1]
- (a) X- rays.
  - (b) UV rays.
  - (c) Beta rays.
  - (d) Gamma rays.

**Ans :** (b) UV rays.

3. The slope of kinetic energy-displacement curve of a particle in motion is [1]
- (a) Equal to the acceleration of the particle.
  - (b) Inversely proportional to the acceleration.
  - (c) Directly proportional to the acceleration.
  - (d) None of these.

**Ans :** (c) Directly proportional to the acceleration.

4. Law of gravitation gives the gravitational force between : [1]
- (a) The earth and a point mass only.
  - (b) The earth and sun only.
  - (c) Any two bodies having some mass.
  - (d) Two charged bodies only.

**Ans :** (c) Any two bodies having some mass.

**or**

A body freely falling under gravity will have uniform :

- (a) Speed
- (b) Velocity
- (c) Momentum
- (d) Acceleration

**Ans :** (d) Acceleration

5. Light is a : [1]
- (a) Longitudinal wave
  - (b) Transverse wave
  - (c) Both (a) and (b)
  - (d) None of these

**Ans :** (b) Transverse wave

6. Who proposed the fluid mosaic model of protoplasm? [1]
- (a) Singer and Nicolson
  - (b) Watson and Crick
  - (c) Robert Hook
  - (d) Robert Brown

**Ans :** (a) Singer and Nicolson.

**or**

Which of the following are complex tissues?

- (a) Xylem and Phloem
- (b) Collenchyma and Sclerenchyma
- (c) Parenchyma and Collenchyma
- (d) Xylem and Parenchyma

**Ans :** (a) Xylem and Phloem

7. Leghorn is related to [1]
- (a) Apiculture
  - (b) Dairy Farming
  - (c) Pisciculture
  - (d) Poultry

**Ans :** (d) Poultry

**or**

Which of the following is cultured for pearls?

- (a) Prawns
- (b) Oysters
- (c) Mulletts
- (d) Bhetki

**Ans :** (b) Oysters

8. What is classification? [1]
- (a) Grouping things together on the basis of the features they have in common.

- (b) Grouping things together on the basis of how they respire.
- (c) Grouping things together on the basis of how they feed.
- (d) Grouping things together on the basis of how they survive.

**Ans :** (a) Grouping things together on the basis of the features they have in common.

**DIRECTION :** For question numbers 9 and 10, two statements are given- one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.

- (a) Both A and R are true and R is correct explanation of the A.
- (b) Both A and R are true but R is not the correct

explanation of the A.

(c) A is true but R is false.

(d) Both A and R are false.

9. **Assertion (A) :** The specific charge of anode ray particles depends on nature of the gas taken in the discharge tube.

**Reason (R) :** The particles in anode rays carry positive charge. [1]

**Ans :** (b) Both A and R are true but R is not the correct explanation of the A.

10. **Assertion (A):** Solid CO<sub>2</sub> changes its state when exposed to air. [1]

**Reason (R) :** CO<sub>2</sub> undergoes sublimation.

**Ans :** (a) Both A and R are true and R is correct explanation of the A.

11. What does odometer of an automobile measure? [1]

**Ans :**

Odometer is a type of device that will help you to measure the distance that has been travelled by an automobile

12. Helium atom has 2 electrons in its valence shell but its valency is not 2. Explain. [1]

**Ans :**

Its valency is zero because its first shell is the outermost shell whose octet is complete. It cannot lose or gain or share electrons.

13. Answer question numbers 13.1–13.4 on the basis of your understanding of the following paragraph and the related studied concepts.



Aarti went on a trip organised by her school to the botanical gardens in Delhi. She was very excited to use the knowledge she had learned in her class to relate it with the flora and fauna in the gardens. When Aarti was looking at all different kind of plants, she spotted some leaves with yellowish colour. She had studied that leaves were green in colour so she was confused. Aarti took one piece of that leaf to her school laboratory, boiled it and then mounted it on a slide to observe under microscope. She then poured a strong sugar solution over it and observed the slide through the microscope.

13.1 Which pigment gives green colour to the leaves? [1]

**Ans :** Chlorophyll.

13.2 What is the function of the above mentioned

pigment? [1]

**Ans :** Chlorophyll helps leaves to trap the sunlight in the process of photosynthesis.

13.3 What did Aarti observe when she poured sugar solution over the slide? [1]

**Ans :** Dead cells cannot absorb water.

13.4 Define plasmolysis. [1]

**Ans :** Plasmolysis is the process of shrinkage or contraction of protoplasm of a plant cell as a result of loss of water from the cell.

14. Questions 14.1 to 14.4 are based on the Table A. Study this table related to boiling points of different compounds and answer the following questions.

**Table A: Boiling points**

Compound	Boiling point (°C)
Ethane	-89
Butane	0
Methanol	64.7
Hexane	69
Pentadecane	270
Heptadecane	302

14.1 A mixture of pentadecane and heptadecane can be separated by ..... [1]

**Ans :** Distillation

14.2 When is the fractional distillation preferred over distillation? [1]

**Ans :** When the difference between boiling points of two compounds is less than 25 K, then fractional distillation is used.

14.3 A mixture of methanol and hexane can be separated by ..... [1]

**Ans :** Fractional Distillation.

14.4 Which of the following pair of compounds are the easiest to separate? [1]

- Ethane and Pentadecane
- Ethane and Heptadecane
- Butane and Hexane
- Butane and Heptadecane

**Ans :** (ii) Ethane and Heptadecane

## Section - B

15. The kinetic energy of an object of mass  $m$ , moving with a velocity of 10 m/s is 25 J. What will be its kinetic energy when its velocity is halved? What will be its kinetic energy when its velocity is increased by 5 times? [3]

**Ans :**

We know that,

$$\text{K.E. of the object} = \frac{1}{2}m(10)^2$$

$$25 = \frac{1}{2} \times m \times 100$$

$$m = 0.5 \text{ kg}$$

If velocity is halved

$$\text{K.E.} = \frac{1}{2} \times m \times (v/2)^2$$

$$\text{K.E.} = \frac{1}{2} \times 0.5 \times (5)^2$$

$$\text{K.E.} = 6.25 \text{ J}$$

If velocity is increased by 5 times

$$\text{K.E.} = \frac{1}{2} \times m \times (5v)^2$$

$$\text{K.E.} = \frac{1}{2} \times 0.5 \times (50)^2$$

$$\text{K.E.} = 625 \text{ J}$$

16. (a) What are cork cells and their functions? [3]  
 (b) Which substance is present in the adipocytes? How does it help?  
 (c) What is xylem? Name the four elements of xylem.

**Ans :**

- (a) The cork cells are the dead tissues, present at the periphery of stem and root. Their main function is to prevent loss of water from plants and they also act as a protective layer.  
 (b) Adipocytes are filled with fat globules. They keep visceral organs in position of forming shock absorbing cushions around them. Storage of fat also acts as an insulator.  
 (c) Xylem is a complex permanent tissue which conducts water and mineral salts upward from roots to leaves. The four elements are: Tracheids, vessels, xylem parenchyma and xylem fibers.

17. (a) Classify the following compounds as diatomic, triatomic and polyatomic molecules. HCl, H<sub>2</sub>, H<sub>2</sub>O and NH<sub>3</sub>.  
 (b) Define the term atomicity. [3]

**Ans :**

- (a) Diatomic : HCl, H<sub>2</sub>  
 Triatomic : H<sub>2</sub>O  
 Polyatomic : NH<sub>3</sub>  
 (b) Atomicity is the total number of atoms present in one molecule of a compound or a substance.

18. (a) What causes the phenomenon of sunrise, sunset and change of seasons? How do we perceive this cause?  
 (b) Is it possible that the train in which you are sitting appears to move while it is at rest? [3]

**Ans :**

- (a) The motion of earth around the sun causes change of seasons. We perceive the motion of earth by observing the change in positions of stars, moon, planets etc. located in outer space.  
 (b) The train in which we are sitting appears to move when the relative position of a point on adjacent train changes. This happens when we are at rest and adjacent train on next track starts moving.

**or**

- (a) In what situation the velocity-time graph a straight line with negative slope?  
 (b) Why is the motion of a train starting from one station and stopping at the other is non-uniform?

**Ans :**

- (a) A straight line v-t graph with negative slope indicates uniform retardation, i.e. the velocity of the body decreases by equal magnitude in equal intervals of time, however small the interval may be.  
 (b) When the train starts from rest from a station, it accelerates to attain a maximum velocity. Thereafter, on reaching the next station, brakes are applied and it retards before it finally comes to rest. Thus, the motion of the train is non-uniform.

19. Give a scientific reason for the following: [3]

- (a) Mitochondria are able to make some of their proteins.  
 (b) A cell having equal water concentration to its surrounding medium.  
 (c) Inner membrane of mitochondria is deeply folded.

**Ans :**

- (a) Mitochondria have their own DNA and ribosomes and hence can make their own protein.  
 (b) A cell having equal water concentration to its surrounding medium will neither gain nor lose water to the external medium.  
 (c) The fold creates a large surface area for ATP generating chemical reactions.

20. (a) Birds and mammals share one common feature. Give details.

- (b) Name the phylum in which animals has soft bodies covered with a hard shell.  
 (c) Ingestion of solid food occurs in which type of nutrition? [3]

**Ans :**

- (a) Both birds and mammals are warm-blooded in nature.  
 (b) Mollusca has animals that have soft bodies covered with a hard shell.  
 (c) Ingestion of solid food occurs in holozoic type of nutrition.

**or**

- (a) Which structure is found in plant cells but absent in animal cell?  
 (b) What is the functional segment of DNA?  
 (c) Name the pigment that imparts red and yellow colour to flowers.

**Ans :**

- (a) Plant cell have chloroplast and cellulose wall, which is absent in animal cell.  
 (b) Gene is segment of DNA, a unit of heredity that is transferred from a parent to offspring.  
 (c) Xanthophyll are coloured pigments just like chlorophyll. Chlorophyll imparts green colour to leaves and xanthophyll imparts red and yellow colour to flowers.

21. A person with mass 10 kg weighs 100 N on earth. What will be his corresponding mass and weight on moon? [3]

**Ans :**

Given,

Mass of the person,  $m = 10 \text{ kg}$

Weight of the person on earth

$$w = mg$$

$$100 = 10 \times g$$

Therefore,

$$g = 10 \text{ m/s}^2$$

Now at moon, the acceleration due to gravity is  $1/6^{\text{th}}$  of the acceleration due to gravity in earth Therefore, acceleration due to gravity on moon

$$g' = (1/6) \times g$$

$$g' = (1/6) \times 10$$

$$g' = 1.66 \text{ m/s}^2$$

Mass of the person will be the same on moon as that on earth =  $m = 10 \text{ kg}$

Weight of the person on Moon'

$$w' = 10 \times 1.66$$

$$w' = 16.6 \text{ N}$$

22. (a) Most mature plant cells have a large central vacuole. Why?  
 (b) Which type of vacuoles are found in plant cells and animal cells? [3]

Ans :

- (a) Plant cell has a large central vacuole full of cell sap to provide turgidity and rigidity to the cell. Many substances of importance in the life of plant cells such as amino acids, sugars, various organic acids and some proteins are stored in these vacuoles.  
 (b) In plant cell, the vacuole is single and prominent whereas in animal cell numerous small vacuoles are scattered in cytoplasm.

or

- (a) How bacterial cell different from an onion peel cell?  
 (b) Why are lysosomes also known as "scavengers of the cells"?

Ans :

- (a) Bacterial cell is a prokaryote whereas onion peel cell is a plant cell: a eukaryote.  
 (b) Lysosomes remove the debris of the cell consisting of dead and worn out cell of organelles by digesting them.

23. A certain particle has a weight of 20 N at a place where the acceleration due to gravity is  $10 \text{ m/s}^2$ .  
 (a) What are its mass and weight at a place where acceleration due to gravity is  $5 \text{ m/s}^2$ ?  
 (b) What will be its mass and weight at a place where acceleration due to gravity is zero? [3]

Ans :

Given, Weight of particle = 20 N  
 Acceleration due to gravity =  $10 \text{ m/s}^2$   
 Mass of particle =  $m$

(a) Weight of particle  $w = mg$   
 $20 = m \times 10$

Therefore,

$$m = 2 \text{ kg}$$

Mass of the particle at a place where acceleration due to gravity =  $5 \text{ m/s}^2$  will be same, that is, 2 kg.

Weight of the particle at a place where acceleration due to gravity =  $5 \text{ m/s}^2$  will be

$$w = mg$$

$$w = 2 \times 5$$

$$w = 0 \text{ N}$$

24. (a) What is the term used for the scientific management of livestock?  
 (b) What do you understand by composite fish culture? Describe in detail with advantages and disadvantages. [3]

Ans :

- (a) Animal husbandry is the scientific management of animal livestock. It includes various aspects such as feeding, breeding and disease control.  
 (b) Composite fish culture system is adopted for intensive fishing. Characteristics of composite fish culture are :  
 (i) Both local as well as imported fish species can be used in such systems.  
 (ii) A combination of five or six fish species is used in a single fish pond.

Advantages :

- (i) All the food available in the pond is utilised. There is no competition for food.  
 (ii) There is increase in the fish yield from the pond.

Disadvantage of composite fish culture:

- (i) Lack of availability of good quality fish seeds

## Section - C

25. (a) Identify the type of inertia in each case and give one more example for the following:  
 (i) A ball thrown upwards by a child in a train returns to his hands.  
 (ii) Mudguards are provided in bikes and cars.  
 (b) A stone released from the top of a tower of height 19.6 m. Calculate its first velocity just before touching the ground. [5]

Ans :

- (a) (i) Inertia of motion is possessed by the ball. Another example is falling of passengers in forward direction if a moving bus comes to a sudden stop.  
 (ii) Inertia of direction because mud flies off tangentially with the wheels and is collected by mudguards. Another example is rotating a disc before releasing it and it moves along the tangent 't' its path of rotation.

(b) Given,  $u = 0$   
 $s = 19.6 \text{ m}$   
 $g = 9.8 \text{ ms}^{-2}$   
 $v^2 = u^2 + 2as = 0 + 2 \times 9.8 \times 19.6$   
 $v = \sqrt{(19.6)^2} = 19.6 \text{ ms}^{-1}$

or

- (a) Define inertia and list its type. Give two examples to describe each type.  
 (b) Define momentum. State its SI unit.

Ans :

- (a) The property of a body by virtue of which it tends to remain in its state of rest or motion is

called inertia.

**Inertia of rest :** The body tends to resist any change in its state of rest, e.g. a boy sitting in car at rest, falls backwards when the car starts moving.

**Inertia of motion :** The body resists any change in its state of motion, e.g. a body falls forward when a car suddenly stops.

**Inertia of direction :** The body resists any change in its direction of motion, e.g. when a car takes a steep turn, people tends to fall outwards.

- (b) The product of mass and velocity of a body is called momentum. S.I. unit of momentum is  $\text{kg ms}^{-1}$

26. Describe the model of atom proposed by Rutherford with his observations and conclusions. Discuss also the drawbacks in his model. [5]

**Ans :**

Rutherford designed an experiment where fast moving alpha particles were made to fall on thin gold foil.

Setup :

- (a) Rutherford selected a gold foil because he want as thin layer as possible. The gold foil here was about 1000 atoms thick.
- (b) Alpha particles are doubly charged helium ions. They have a considerable amount of energy inside them.
- (c) Rutherford expected these alpha particles to undergo small deflections by the protons present in the gold foil.

**Observations :** The results that were obtained were totally unexpected.

- (a) Most of the alpha particles passed straight through the gold foil.
- (b) Some of the alpha particles were deflected by small angles.
- (c) One out of every 12000 alpha particles appeared to rebound from the gold foil.

**Conclusions :**

- (a) Most of the space inside the atom is empty because most of the alpha particles passed through the foil without getting deflected.
- (b) As very few alpha particles were deflected, it concludes that positive charge occupies a very small space inside an atom.
- (c) A very small number of alpha particles were completely rebounded, which means that the amount of positive charge is high and concentrated within a small volume inside the atom.

**Features of the model :**

- (a) Every atom has a positively charged center known as nucleus.
- (b) The electrons revolve around the nucleus in circular paths.
- (c) The size of the nucleus is very small compared to the actual size of the atom.

**Drawback of the proposed model :**

- (a) The electrons revolving around the nucleus should not be stable.
- (b) They undergo circular acceleration and while doing so, keep radiating energy and then finally fall into the nucleus. By such logic, the atom

should cease to exist. We know that atoms are quite stable.

- 27. (a) A person takes concentrated solution of salt, after sometime, he starts vomiting. What is the phenomenon responsible for such situation? Explain.
- (b) Bacteria do not have chloroplast but some bacteria are photoautotrophic in nature and perform photosynthesis. Which part of bacterial cell performs this?
- (c) Which cell organelle controls most of the activities of the cell? [5]

**Ans :**

- (a) The concentrated salt solution causes irritation and excessive dehydration in the stomach due to exosmosis. This makes the person uncomfortable causing reverse movements and thus vomiting.
- (b) Photoautotrophic bacteria possess photosynthetic pigments inside small vesicles associated with plasma membrane.
- (c) Nucleus controls the metabolism and most of the activities of cell.

**or**

In brief state what happens when

- (a) Rheo leaves are boiled in water first and then a drop of sugar syrup is put on it?
- (b) Dry apricots are left for some time in pure water and later transferred to sugar solution?
- (c) A red blood cell is kept in concentrated saline solution?
- (d) Golgi apparatus is removed from the cell?

**Ans :**

- (a) The cell gets killed on boiling so no change will be observed.
- (b) First it swells due to endosmosis and then it shrinks due to exosmosis.
- (c) It will lose water and shrink.
- (d) All sorts of vesicle and lysosome formation stops.

- 28. A stone is thrown upwards with a velocity of 30 m/s.
  - (a) At what height will its kinetic energy be half of its potential energy?
  - (b) Calculate the potential energy of the body if it's mass = 5 kg. [5]

**Ans :**

Given,

Initial velocity,  $v = 0 \text{ m/s}$

Final velocity,  $v = 30 \text{ m/s}$

$m = \text{mass of the body}$

(a) Kinetic Energy,  $\text{K.E} = \frac{1}{2}mv^2$

Potential Energy = P.E. =  $mgh$

Given,  $\text{K.E.} = \frac{1}{2} \text{ P.E.}$

$\frac{1}{2}mv^2 = \frac{1}{2}mgh$

$v^2 = gh$

$30 \times 30 = 10 \times h$

$H = 90 \text{ m}$

(b) P.E. =  $mgh$

$$= 5 \times 10 \times 90 = 4500 \text{ J}$$

29. (a) Describe the process of diffusion of O<sub>2</sub> and CO<sub>2</sub> through the cell membranes.  
 (b) Define osmosis. [5]

Ans :

- (a) CO<sub>2</sub> is a cellular waste which accumulates in high concentrations inside the cell and needs to be excreted out. In the cell's external environment, the concentration of CO<sub>2</sub> is low as compared to inside of the cell. As soon as there is a difference in concentration of CO<sub>2</sub> inside and outside the cell, CO<sub>2</sub> tends to move out of it from a region of higher concentration to a region of lower concentration by the process of diffusion. Similarly, O<sub>2</sub> enters the cell by the process of diffusion when the level or concentration of O<sub>2</sub> inside the cell decreases with respect to the outside. Thus, diffusion plays an important role in gaseous exchange between the cells as well as the cell and its external environment.
- (b) Osmosis is a process that is similar to diffusion, but the only difference between them is that Osmosis happens through a selectively permeable membrane. For example; the passage of water from a region of high water concentration through a selectively permeable membrane to a region of low water concentration till equilibrium is reached, is called Osmosis.

or

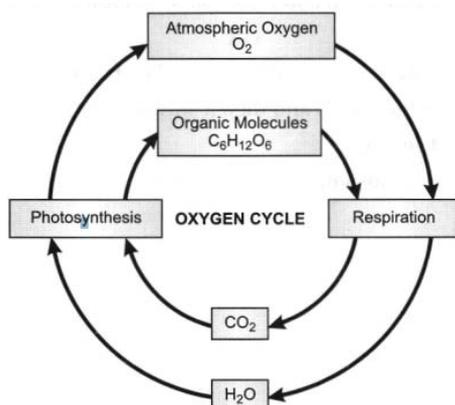
You are provided with a mixture containing sand, iron filing, ammonium chloride and sodium chloride. Describe the procedures you would use to separate these constituents from the mixture?

Ans :

- (a) Remove iron filings with the help of magnet.  
 (b) Sand and ammonium chloride can be separated by sublimation. Ammonium chloride will get vapourised and change into vapours and on condensation will form NH<sub>4</sub>Cl(s), sand and sodium chloride will be left in china dish.  
 (c) Dissolve the sand and sodium chloride in water. Sodium chloride will dissolve. Filter the sodium. Sand will be left as residue.  
 (d) Evaporate the filtrate to dryness to get sodium chloride back or use crystallisation.

30. Describe the oxygen cycle with appropriate diagrams. [5]

Ans :



After nitrogen, oxygen is one of the most abundant elements on earth. About 21% of our air is composed of oxygen. It is also an atom in the molecule of water (H<sub>2</sub>O). Oxide compounds, such as CO<sub>2</sub> also contain oxygen.

As we are aware oxygen is absolutely essential for all living organisms to survive. It is the main component in respiration. It is also the element that allows and assists combustion of any kind. Through photosynthesis, the replenishment of oxygen in the atmosphere is done, where oxygen is one of the by products. In fact, photosynthesis and respiration are interdependent mechanisms that perform a unique and amazing balancing.

The steps involved in the oxygen cycle are :

**Stage-1 :** All green plants during the process of photosynthesis, release oxygen back into the atmosphere as a by-product.

**Stage-2 :** All aerobic organisms use free oxygen for respiration.

**Stage-3 :** Animals exhale carbon dioxide back into the atmosphere which is again used by the plants during photosynthesis. Now oxygen is balanced within the atmosphere.

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